Metropolitan Sewers.

A REPORT

TO THE

SURVEY COMMITTEE ON STREET CLEANSING.

Presented 22nd January, 1849,

By THOMAS LOVICK, Assistant Surveyor.

In obedience to the directions of the Committee, I beg to submit the following Report on the Surface Cleansing of Streets:

In order to determine the practicability of a system of Surface Cleansing by water, I have made experiments to ascertain its capabilities, mechanical, economical, sanitary, as follows:—

MECHANICAL AND ECONOMICAL.

First Series.—Summary of experiments in Cleansing the Carriage-ways of Charles Street, Old and New Compton Street, Church Passage, Dean Street, Greek Street; Westminster.

Number of men employed	4.
Time during which men were employed	5 hours 10 minutes.
Size of jets used	$\frac{5}{8}$, $\frac{3}{4}$, and 1, inch.
Extreme length of hose through which water was delivered	317 feet.
Average length of hose through which water was delivered	233 feet.
Time occupied in shifting hose	$1\frac{1}{2}$ hours.
Average rate of flow of water through jets	.39 gallons in 1 second.
Time during which water was used for cleansing	3 hours, 43 minutes.
Water used for cleansing	5,285 gallons.
Superficies of carriage-way cleansed	5,325 yards.

SUMMARY OF ACTUAL COST.

5,285 gallons of water, at per 1000 gallons, 1d.*	0 „ $5\frac{1}{4}$	10s. $9\frac{1}{4}$d.
Four men, each 5 hours 10 minutes, at per hour per man, 6d.	10 „ 4	

Or at the rate of $2\frac{1}{4}$d. nearly, per 100 yards.

* On Wicksteed's data. Evidence before Commissioners for enquiring into the State of large Towns, &c. see their First Report.

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SECOND SERIES.—Summary of experiments in cleansing Church Passage and Lloyd's Court, St Giles's.

SITUATION.	No. of Men employed.	Time cleansing, Minutes.	Water used, Gallons.	Surface cleansed, Yards.	Cost of Labour and Water.
Church Passage .	3	10	90	91	1½
Lloyd's Court . .	3	10	193	206	3¼
Total . .	3	20	283	297	4¾

Or at the rate of one penny, nearly, per 100 yards.

THIRD SERIES.—Summary of experiments in cleansing Church Lane, Kennedy's Court, Fletcher's Court, Pearl Court, Lloyd's Court; St Giles's.

SITUATION.	No. of Men employed.	Time cleansing, Minutes.	Water used, Gallons.	Surface cleansed, Yards.	Cost of Labour and Water.
Church Lane . .	3	35.57	686.29	793	11.66
Kennedy's Court .	3	3.92	75.29	87	1.27
Fletcher's Court .	3	3.18	61.44	71	1.04
Pearl Court . .	3	3.50	67.50	78	1.14
Lloyd's Court . .	3	8.83	170.48	197	2.89
Total . . .	3	55.00	1061.00	1,226	18.00

Or in the cleansing of 1,226 square yards, the labour of three men was employed for a period of 55 minutes, with a consumption of 1,061 gallons of water, at a total cost of eighteen-pence, being at the rate of three-halfpence per 100 yards.

MODE OF APPLICATION.—The application of the water was effected from the mains of the Water Companies, by hose and jets; some circular, of varying diameters, others rectangular in form. The first delivery, cylindroids, the second, diverging sheets, of water.

In addition to the direct mechanical application of the water in the removal from the surface of the accumulated impurities, it was employed to remove, by absorption, from the atmosphere the noxious gases which had resulted from the decomposition of these accumulations. For this purpose, the diverging sheet-formed jets proved admirably adapted. The whole of the accumulations were washed into the sewers.

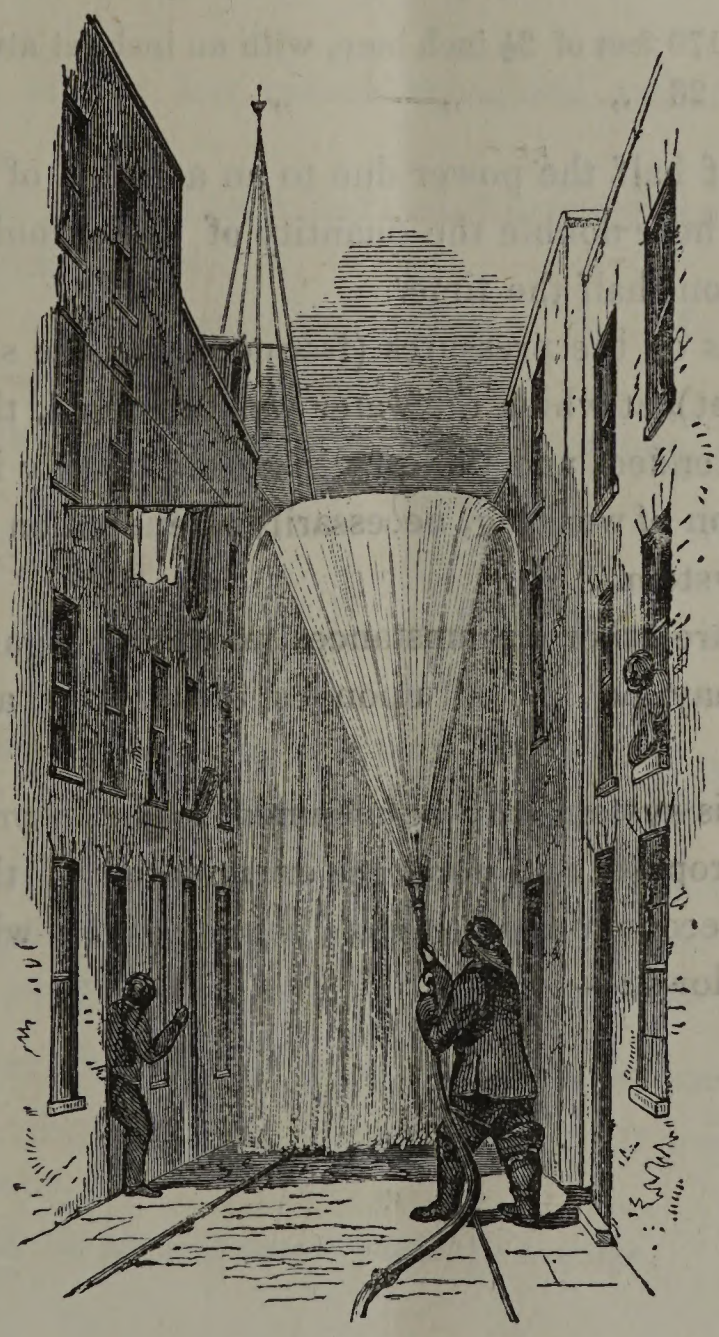
In order to convey a clearer idea of the method of application, I submit the annexed drawings: No. 1 showing the method of surface-cleansing; No. 2, the method for the absorption of atmospheric impurities.

STREET CLEANSING BY WATER WITH HOSE AND JET.

No. 1.—*Illustration of surface-cleansing by water.*

STREET CLEANSING BY WATER WITH HOSE AND JET.

No. 2.—*Illustration of method of using jet for absorption of atmospheric impurities.*



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Many of the streets and courts in which these experiments were performed, were (before cleansing) in a most filthy and insalubrious condition; the surface coated with mud, and strewn with offal and refuse of the most disgusting nature; in the interstices between the paving, and in the hollows formed by its partial settlement, stagnant fœtid liquids had collected, charging the atmosphere with their offensive exhalations.

The application of water in the removal of the surface accumulations, and absorption of atmospheric impurities, was effectual and perfect, producing marked changes in the character of the localities, inducing a condition of salubrity and freshness, further increased by a reduction of temperature, a result invariably attendant upon these operations.

A full appreciation of the advantages of this system appeared to exist in the localities to which it was applied; the inhabitants, especially of the poorer class, strongly expressing their thanks, and wishing for its further and continuous application.

To the fullest, efficient, and economical application of this system, under present arrangements, there are many retarding causes.

From friction—consequent on the distance between the water-plugs greatly increasing the requisite length of hose. From experiments made to ascertain the extent of this influence, it was found that the time required for the passage of equal quantities of water

Through a length of 170 feet of 2½ inch hose, with an inch jet attached, was 1 second.
„ „ 26 „ „ „ „ „ was ½ „

Showing a loss of half the power due to an addition of 144 feet. Thus, with the shorter length of hose double the quantity of work would be performed, or it could be executed in one half the time.

From the lowness of the pressures (frequently at the stand-cock at not more than from 25 to 30 feet), at which the water was delivered, the period of its application was greatly extended, and the quantity used largely increased.

From imperfection of working, necessarily attendant on first experiments with men untrained to a system.

Although there are other circumstances militating against the full effect of this system, these may be looked upon as those most affecting its practical extension.

The utility of this system may be assumed to be in proportion to its extensive application; I propose, therefore, the examination of the subject with reference principally to its economical extension, comparatively with the economy of the present system, as follows:—

STREET CLEANSING BY SWEEPING.

From an analysis of evidence given before the Sanitary Commissioners, it appears that the cost of street cleansing by sweeping is in one parish as follows:

For cleansing 52,471 square yards daily, for one year:

	£
Cost of labour	424
Cost of removing detritus and refuse from the surface, 4,800 loads, at say 2s. 4d. per load	560
Total for cleansing 52,471 square yards daily, for one year . .	984

An accurate return of the cost of cleansing in another district, gives the following:—

	Sq. Yds.	£
For sweeping for one year, once per week . .	47,917	
Ditto, . . twice do. . .	9,824	354
Ditto, . . thrice do. . .	25,724	
For removing detritus and refuse during the same period . .		317
		681

If we apply this data to the whole of the Metropolis, an approximate result sufficiently near for estimating the actual cost of street cleansing may be obtained.

The Metropolis at the last census contained rather more than 270,000 houses.

In the district last referred to, I find that the quantity of carriage-way to each house is about 27.7 square yards.

The quantity of carriage-way, therefore, in the Metropolis by this data, $(270{,}000 \times 27.7)$ is nearly 7,500,000 square yards.

If the whole of the carriage-way in the Metropolis, assumed on this data, was cleansed daily by sweeping, the cost would be—

	£			£
By the first data . . .	$\frac{7{,}500{,}000}{52{,}471}$	× 948	=	135,469
By the second data, with the same ratio of cleansing . . .	$\frac{7{,}500{,}000}{83{,}465}$	× 671	=	60,289

As there are differences in the paving of the districts upon which the data is founded, and in the system pursued, an average result may be best obtained by taking the quantities swept once a week in each district—

By the first data $(52{,}471 \times 6) = 314{,}826$ yards cleansed once a week.

By the second data $(25{,}724 \times 3 + 9{,}824 \times 2 + 47{,}917) = 145{,}000$ yards cleansed once a week, nearly.

$\frac{314{,}826 + 145{,}000}{2} = 229{,}913$ square yards the average.

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Applying this data, the cost of cleansing the Metropolis will be as follows:—

	Once Cleansing per Week for One Year.	Daily Cleansing for One Year.
By first data . . .	22,593	135,469
By second data . . .	34,690	208,140
Averages	28,642	171,804

The larger of these sums I am inclined to believe is the nearest approximation, being founded upon data obtained from a larger district, in which there is every diversity of traffic.

STREET CLEANSING BY JETS OF WATER.

In estimating the cost of street cleansing by water, equal facilities to those possessed for the previous estimate are not at command. In the one system it may be fairly assumed that from long practice the utmost economy of working has been obtained. The practicability only of the proposed system has been shown, with the ratios of cost determined by few and limited experiments. Estimates founded upon this data must necessarily be proximate in their nature.

Although materials are afforded for a comparison, its accuracy is impaired by the dissimilarity in position of the systems. From this it is obvious that the system hitherto practised (cleansing by sweeping), must stand in a more advantageous light than the system (cleansing by water) now introduced, and as yet unapplied.

Referring to my experiments on this subject, it will be perceived that there is an evident improvement in the working of the system, the latest series of experiments indicating an increase of work, due chiefly to the previous practice.

In this series it appears that in the cleansing by jets of water 1,226 square yards of paving in streets and courts, there were employed three men for a period of 55 minutes, with a consumption of 1,061 gallons of water, at a cost of 1s. 6d.

The ratios of labour, water, and cost are, therefore,—

For one man, one day of ten working hours, 4,500 yards, nearly.

For labour, taking the wages of one man, at 3s. per day, eight pence per 1,000 yards.

For water, 865 gallons per 1,000 yards.

Referring to Mr Lee's (of Sheffield) Report, I find the following as the result of experiments made by him :

For cleansing 1,100 square yards of carriage-way two men were employed for a period of 20 minutes, with a consumption of 255 gallons of water.

The ratios of labour, water, and cost are, therefore,—

For one man, 1,000 square yards in 36 minutes; or for one day of 10 working hours, 16,666 square yards.

For labour, taking the wages of one man at 3s. per day (rather more than) two-pence per 1,000 yards.

The rate of cost of water in each case may be assumed (on Mr Wicksteed's data) at one penny per 1,000 gallons.

To reconcile the apparent disproportion between my own and Mr Lee's experiments, some explanation of the circumstances under which each was made is necessary. In Mr Lee's Report it is stated that "In the experiment (cleansing by jets of water) the jet from an 1¼ inch discharge-pipe, with 350 feet pressure, rose to about 60 feet vertical height."

In my own experiments, using only a ⅝ inch jet, the greatest vertical height to which the jet at any time ascended did not exceed 20 feet; less by 40 feet the column of water from an 1¼ inch jet in Mr Lee's experiment.

The cause of this disparity is at once obvious, and an important feature in the economy of working is ascertained, bearing materially upon the application of this system; for it results, from a comparison of the experiments, that the expenditure in my own experiments, with low pressures, is 3.7 times greater than the expenditure with high pressures in Mr Lee's, showing an economy in favour of the high pressure of nearly 373 per cent.

To apply this system to the cleansing of the Metropolis.—Taking as before the number of houses in London at 270,000, and the carriage-way to each house at 27.7 square yards, equal to a total of 7,500,000 square yards, assuming this to be a paved surface, the cost of its application will be as follows:—

BY MY OWN EXPERIMENTS.

TABLE, No. 1.

	Once Cleansing.	Once a Week Cleansing for One Year.	Daily Cleansing for One Year.
	£ s.	£	£
Cost of Labour	250 0	13,000	
„ Water	31 5	1,625	
Interest of first cost of Hose, say .		236	
Wear and Tear of Hose, &c., say .		708	
Total		15,569	93,414

BY MR LEE'S EXPERIMENTS.

TABLE, No. 2.

	Once Cleansing.	Once a week Cleansing for One Year.	Daily Cleansing for One Year.
	£ s.	£	£
Cost of Labour	62 10	3,250	
„ Water	31 5	1,625	
Interest on first cost of Hose, say .		236	
Wear and Tear of Hose, &c., say .		708	
Total		5,819	34,914

So as not to under-estimate the cost of apparatus, I have assumed in both Tables that this expense is in direct proportion to the times of cleansing.

Taking the cost of labour and water only, for one year's daily cleansing, the estimates will stand thus—

By Table No. 1	£87,750
By ditto No. 2	29,250
Difference	58,500

Therefore it results that the expense is three times greater in the one instance than in the other, due, I assume, chiefly to the difference of pressure in each case.

The removal of the refuse sent into the sewers from the surface, is an important element in the calculation.

Taking the yearly amount of detritus and refuse removed from the streets at 68,000 loads = 102,000 cube yards, I assume this as the quantity to be removed.

Estimating the cost of its removal (by flushing) from the sewers at 6d. per cubic yard (at which it may be removed if done simultaneously with the surface cleansing) the expense would be (102,000 × 6d.) = £2,550.

With this addition, the estimates will stand thus—

By Table No. 1, £87,750 + 2,550 = £90,300
By ditto No. 2, £29,250 + 2,550 = £31,800

The comparative estimates of street cleansing by sweeping and by water are, therefore, as follow :—

STREET CLEANSING DAILY FOR ONE YEAR.

	By Sweeping, Average.	By Water.	Difference.
	£	£	£
By 1st data, and Table No. 1 . .	171,804	90,300	81,504
By 2nd data, and Table No. 2 . .		31,800	140,004

It is anticipated that the general adoption of the system of cleansing by water, by removing the accumulations of dirt and refuse, will supersede the necessity for watering the streets as now practised. In the district before mentioned I find that the cost of watering 25,300 square yards of carriage-way for the season is 154*l.*, and that the portion watered is one-third of the carriage-way in the district.

At this rate of charge the watering of the whole of the carriage-way of London, on the foregoing data, would amount to 45,645*l.*

Taking, however, the same proportionate quantity of watering performed—one-third of the whole amount—the cost would be 15,215*l.*; adding this to the average cost for daily cleansing, by sweeping, for one year (171,804*l.*), increases the expense of that system to 187,019*l.*

The comparative estimates with this addition are exhibited in the annexed table.

TABLE 3.

	By sweeping, including the watering of the streets. Average.	By water.	Differences.
	£	£	£
By 1st data, and Table No. 1. . .	187,019	90,300	96,719
By 2nd data, and Table No. 2. .		31,800	155,219

One advantage of the system of water cleansing is in its application to the cleansing of the foot-ways as well as the carriage-ways of streets. Under the present system the carriage-ways only are cleansed. The proportion of the footways to the carriage-ways, on the data before given, is as four to seven. Assuming that in addition to the carriage-ways the foot-ways also were cleansed, there would still be a large saving as compared with the present systems, under which only a portion of the work is performed. Or if the quantity by sweeping is represented by one, the quantity of cleansing performed by water would be represented by one four-sevenths, with, in addition, a considerable saving in the ultimate expenditure, without taking into account the much greater facilities with which the foot-ways as compared with the carriage-ways can be cleansed.

Results even more favourable to the system of cleansing by water might have been obtained, had comparisons been made of the relative efficiency of the systems; still more would the result have been influenced had estimates of the economy of working obtained by practice, and of the increased dispatch in the performance of the work by frequent cleansing, been considered.

The frequency of application of this system to the cleansing of the streets would be determined by their specific requirements; some, as the main thoroughfares, requiring daily cleansing, others cleansing at longer intervals. Thorough-

fares having a large amount of traffic would require cleansing at an early period of the day; from this period to the cleansing on the following day the accumulations will have been going on, and the exhalations from them discharging into the atmosphere. It may be necessary to employ measures for the prevention of this condition in conjunction with the systematic operations of cleansing by water. To effect this there are two methods. By sweeping, with hand labour, and cartage of the refuse. By the cleansing-machine.

Hand-labour, when compared with the cleansing-machine, would appear to be the least economical, in the proportion, as stated in Mr Whitworth's evidence, of about three to one. The machine, therefore, would appear to be the best adapted for application to this peculiar purpose, and with the least interference with the traffic of the street.

It has been deemed advisable to show the application of the data given in the preceding estimates to the cleansing within a limited period, under present arrangements, one or two main thoroughfares.

For this purpose I have selected the Strand with its courts, and High street, Borough, and have assumed in the following estimates one hour as the period of limitation.

I have estimated the staff of men and quantities of materials that would be required for the daily cleansing of the foot and carriage-ways within that period, with the rate of cost per house per week; also the additional force requisite in one street to cleanse within the same period the courts and alleys branching therefrom.

The cost of cleansing by water has been shown to be as follows:—

By my own experiments.—Cost of labour and water, 9d. per 1,000 yards. Performance of one man per hour, 450 square yards of surface cleansed.

By Mr Lee's experiments, the cost is about *one-third* of the above, and the performance of one man per hour 1,666 square yards of surface cleansed.

The extreme limitation of the period of cleansing necessarily increases the effective force, and its division into the smallest efficient working gangs, each using distinct apparatus. The estimates with these considerations are exhibited in the following Tables:—

Estimates for Cleansing with Water (by the Hose and Jet).

THE STRAND AND ITS COURTS.

Description of Paving.	Quantity of Paving, Square Yards.	No. of Houses in Street.	Paving to each House. Square Yards.	No. of Men required.		Apparatus required.		Double Stand-cocks required.		Cost, Labour and Water, for Daily Cleansing, per House per Week.	
				Lovick.	Lee.	Lovick.	Lee.	Lovick.	Lee.	Lovick.	Lee.
Carriage-way .	20726	378	55	46	12	3000	800	8	2	3d. nearly	1d. nearly
Foot-way . .	8262		...	18	5	1200	400	3	1	$1\frac{1}{4}$ „	$\frac{1}{2}$ „
„ in the Courts . .	5144			11	3	800	200	2	1		
Total . .				75	20	5000	1400	13	4	$4\frac{1}{4}$d. nearly	$1\frac{1}{2}$d. nearly

HIGH STREET, BOROUGH.

Description of Paving.	Quantity of Paving. Square Yards.	No. of Houses in Street.	Paving to each House. Square Yards.	No. of Men required.		Apparatus required.		Double Stand-cocks required.		Cost, Labour and Water. for Daily Cleansing, per House per Week.	
				Lovick.	Lee.	Lovick.	Lee.	Lovick.	Lee.	Lovick.	Lee.
Carriage-way .	8707	179	49	19	5	1200	400	3	1	$2\frac{3}{4}$d. nearly	1d. nearly
Foot-way . .	2284		13	5	1	400		1		$\frac{3}{4}$ „	$\frac{1}{4}$ „
Total . .				24	6	1600	400	4	1	$3\frac{1}{2}$d. „	$1\frac{1}{4}$d. „

If the highest data is taken for a summary of the estimates it appears that, in the Strand, the force required for cleansing in one hour would be, for the carriage-way, forty-six men; and the cost for daily cleansing per house per week, threepence, nearly. For the footways, in addition, eighteen men, and the cost for daily cleansing per house per week, one penny farthing, nearly. Total per house per week, for daily cleansing the foot and carriage-ways, fourpence farthing.

Taking the cleansing of the courts simultaneously with the cleansing of the streets, the additional force required would be eleven men.

In High street, the force required for cleansing in one hour the carriage-way would be nineteen men, and the cost of daily cleansing per house per week, tow-pence three farthings, nearly. That the force, in addition, required for the foot-ways is five men, and the cost for daily cleansing per house per week, three farthings, nearly, or a total per house per week for daily cleansing the foot and carriage-ways of threepence half-penny.

The data, the basis of these estimates, are deduced from experiments on the *first* cleansing of streets, from which a large accumulation of refuse had to be removed. Every *subsequent* periodic cleansing could be performed with extreme facility, and in the ratio of its frequent application. This has been considered as fully equivalent to the wear and tear, &c., of apparatus; the cost of working, therefore, has been assumed of labour and water only.

If in connection with an extended system, the apparatus would be used for the cleansing of minor streets after the prescribed period, still further economising its application.

I beg to submit, as an appendix hereto, estimates of the cost of laying down separate mains, with the requisite apparatus for cleansing these streets.

THOS LOVICK.

JANUARY 11th, 1849.

APPENDIX.

ESTIMATE for laying down in the Strand a 4-inch main, with 3-inch branches of glazed stone-ware pipes for supply of water, and of apparatus requisite for cleansing with water this street.

Description of Materials, &c.	Quantities. Lineal Yards.	Quantities. No.	Rate of Charge. £ s. d.	Cost. £ s. d.	Total Cost. £ s. d.
4-inch Main Pipe for supply of Water . .	1350	...	0 1 6	101 5 0	
Digging, including Watching, Fencing, &c., Laying and Jointing Pipes . . .	1350	...	0 0 9	50 12 6	
Relaying Paving disturbed . . .	1350	...	0 1 0	67 10 0	219 7 6
3-inch Branch Service Pipes from Main .	400	...	0 1 3	25 0 0	
3-inch Bends	...	39	0 1 3	2 8 9	
3-inch Single Junctions, with 4-inch Main .	...	9	0 0 6	0 4 6	
3-inch Double Junctions . . .	...	15	0 1 0	0 15 0	
Digging, as above, to the Branches . .	400	...	0 0 9	15 0 0	
Relaying Paving disturbed . .	400	..	0 1 0	20 0 0	63 8 3
Plugs and Boxes, for attachment of Stand Cock and Hose	...	39	0 16 0	31 4 0	
Stand Cocks, with two curved Discharging Orifices	...	10	4 0 0	40 0 0	
Flaxen Hose, including the connecting Brass Unions and Screws . . .	667	...	0 4 - 2	133 8 0	
One 4-inch Valve, or Sluice Cock, for shutting off Water (as a provision against accidents)	...	...	...	3 0 0	207 12 0
					490 7 9
If the Mains and Branches are laid on Concrete, there will be an addition to the expense of , . , .	1750	...	0 1 6	...	131 5 0
					£621 12 9

ESTIMATE for laying down in High street, Borough,* a 4-inch main, with 3-inch branches, of glazed stone-ware pipes for supply of water, and of apparatus requisite for cleansing with water the street.

Description of Materials, &c.	Quantities.		Rate of Charge.	Cost.	Total Cost.
	Lineal Yards.	No.			
			£ s. d.	£ s. d.	£ s. d.
4-inch Main Pipe for supply of Water . .	633	...	0 1 6	47 9 6	
Digging, including Watching, Fencing, &c., Laying and Jointing Pipes . .	633	...	0 0 9	23 14 9	
Relaying Paving disturbed . .	633	...	0 1 0	31 13 0	102 17 3
3-inch Branch Service Pipes from Main .	170	...	0 1 3	10 12 6	
3-inch Bends	...	20	0 1 3	1 5 0	
3-inch Single Junctions . . .	...	6	0 0 6	0 3 0	
3-inch Double Junctions . . .	...	14	0 1 0	0 14 0	
Digging, as above	170	...	0 0 9	6 7 6	
Relaying Paving disturbed . .	170	...	0 1 0	8 10 0	27 12 0
Plugs and Boxes, for attachment of Stand Cock and Hose	—	20	0 16 0	16 0 0	
Stand Cocks, with two curved Discharging Orifices	...	5	4 0 0	20 0 0	
Flaxen Hose, including the connecting Brass Unions and Screws . . .	333	...	0 4 0	66 12 0	
One 4-inch Valve, or Sluice Cock, for shutting off Water (as a provision against accidents)	...	...	...	3 0 0	105 12 0
					236 1 3
If the Mains and Branches are laid on Concrete, there will be an addition to the expense of	803	...	0 1 6	...	60 4 6
					£296 5 9

* High street, Borough, from St George's Church to St Thomas's Hospital.

NOTE.—The average depth of the Pipes below the surface is taken at 4 feet.

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Metropolitan Sewers.

A REPORT

TO THE

SURVEY COMMITTEE

ON

STREET CLEANSING

Presented 22nd January, 1849,

By THOMAS LOVICK, Assistant Surveyo

Reynell and Weight, 16 Little Pulteney street.

ESTIMATE for laying down in High street, Borough,* a 4-inch main, with 3-inch branches, of glazed stone-ware pipes for supply of water, and of apparatus requisite for cleansing with water the street.

Description of Materials, &c.	Quantities.		Rate of Charge.	Cost.	Total Cost.
	Lineal Yards.	No.			
			£ s. d.	£ s. d.	£ s. d.
4-inch Main Pipe for supply of Water . .	633	...	0 1 6	47 9 6	
Digging, including Watching, Fencing, &c., Laying and Jointing Pipes . .	633	...	0 0 9	23 14 9	
Relaying Paving disturbed . .	633	...	0 1 0	31 13 0	102 17 3
3-inch Branch Service Pipes from Main .	170	...	0 1 3	10 12 6	
3-inch Bends	...	20	0 1 3	1 5 0	
3-inch Single Junctions . . .	...	6	0 0 6	0 3 0	
3-inch Double Junctions . . .	...	14	0 1 0	0 14 0	
Digging, as above	170	...	0 0 9	6 7 6	
Relaying Paving disturbed . .	170	...	0 1 0	8 10 0	27 12 0
Plugs and Boxes, for attachment of Stand Cock and Hose	—	20	0 16 0	16 0 0	
Stand Cocks, with two curved Discharging Orifices	...	5	4 0 0	20 0 0	
Flaxen Hose, including the connecting Brass Unions and Screws . . .	333	...	0 4 0	66 12 0	
One 4-inch Valve, or Sluice Cock, for shutting off Water (as a provision against accidents)	...	...	...	3 0 0	105 12 0
					236 1 3
If the Mains and Branches are laid on Concrete, there will be an addition to the expense of	803	...	0 1 6	...	60 4 6
					£296 5 9

* High street, Borough, from St George's Church to St Thomas's Hospital.

NOTE.—The average depth of the Pipes below the surface is taken at 4 feet.

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